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of the bay were landed. All were well supplied with guns, and also with good boats and sleds, with which the Saglern, who had hunted over the ground for centuries, could not compete. The station proved a failure, and when it was removed to Repulse Bay in 1903, only one woman and four children went with it, the sole survivors of a once numerous people. They were adopted by the Iwilic of Repulse Bay, and when, in 1908, I left a colony of about seventy Aiviliks on Southampton Island at a point north of Cape Kendall, among them were two surviving children of the Saglernmiut—too young, however, to remember the traditions and customs of their people.

Before closing this article, I feel it my duty to call the attention of all governments that are interested in the whaling industry of Hudson Bay and Straits to the need of some uniform legislation which will restrict the indiscriminate slaughter of these animals. I am speaking as one who has had years of experience, and I do not hesitate to predict the early extermination of the whales in these enclosed waters unless some restrictive measure is adopted. During the summer months, whales, seals and the abundance of terrestrial animal life add so materially to the interest of the country, that it would be a public calamity for the zeal of those commercially interested to destroy these features of its attractiveness.

# TRADE ROUTES IN THE ECONOMIC GEOGRAPHY OF BOLIVIA*

(*Continued*)

BY

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## ARGENTINA-BOLIVIA.

The Antofagasta railway, ever since its completion in 1892, has been the sole means of rail transportation to southern and central Bolivia. This position it will soon lose as work on the new line is now completed to the Argentine frontier at La Quiaca and a recent understanding between Bolivia and the Argentine Republic provides for its extension to Uyuni by the latter country at an early date. The line follows in the general direction of the old mule track into Bolivia, one of the most famous of the early South American roads. The mule track runs for much of the distance along the watercourses, naturally graded and firm roads in the dry season, but impassable when the streams are in flood. Over this route came a portion of the goods supplied to Argentina, via Panama, in the days when that port enjoyed a trading monopoly of all the goods sent to Spanish America. Later, when importations came via Buenos Aires, caravans began regular journeys into Bolivia bearing merchandise of cloth chiefly, besides important quantities of tea, spices, jewelry and the costlier varieties of hardware. For these,

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* See *Bulletin*, January, 1910, p. 22.

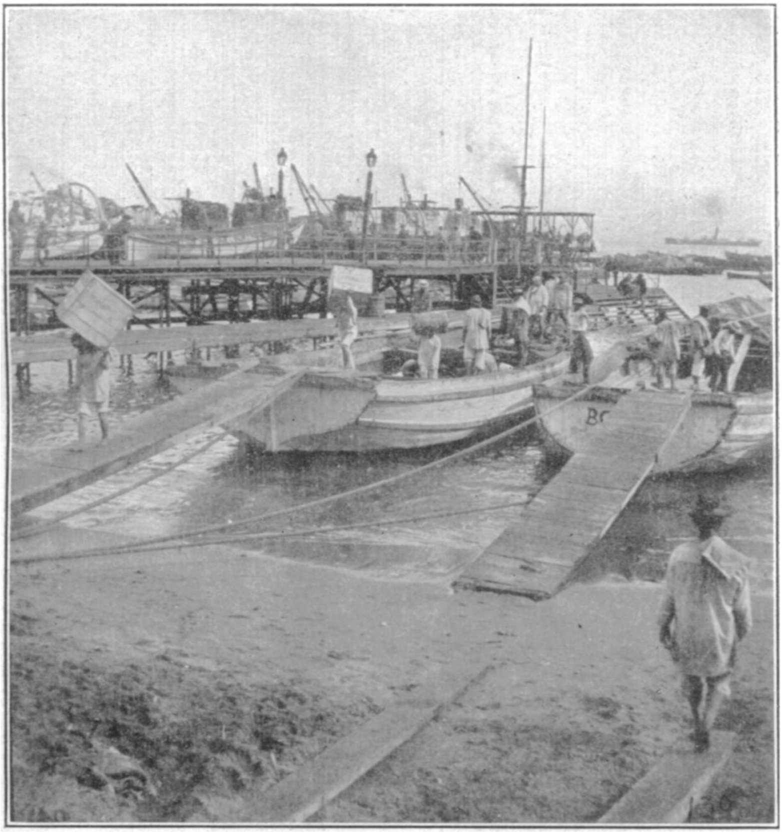

FIG. 10. LANDING FREIGHT AT ANTOFAGASTA.

**Cargoes are unloaded from the lighters by cranes or carried on the backs of workmen.**

were exchanged the silver, blankets, dried and hence light-weight potatoes, and the coca, of the mountain Indians. It is interesting to note that a large part of the exchange is by barter even to this day, though purchases were made outright, from the first, owing to the lack of plateau products of sufficient amount to balance the Argentine trade, and the large quantities of tin and silver the plateau has always produced, which in both its stamped and unstamped condition has served as currency among the traders.

Great quantities of goods go over this trail to-day and the quantity is steadily increasing as the progressive northerly extension of the road reduces, by corresponding amounts, the high freight charges for mule transportation. The goods are now shipped cheaply by rail to the Argentine border and thence go by freight coach or pack mule 175 miles to the railroad at Uyuni. They are then available at any of the stations as far as Oruro and La Paz. At Challapata the goods may be shipped by mule cart to Sucre and at Oruro by freight coach or caravan to Cochabamba. Italian traders among others make this journey with cloth goods ranging in quality from cheap woolens to expensive silks. Orders are not taken to be filled later, but the traveling salesman brings his entire stock with him and when he is sold out returns for another consignment. The annual fair at Huari, 60-70 miles south of Oruro, also witnesses a great movement of goods over the old road. For a time, trade over this route fell off, notably on account of cheaper shipping facilities over the Antofagasta route* but the road from the south has been extended so far that the current of trade from this direction is now regaining its old-time force.

The distinctive quality of the completed road will be its connection with an Atlantic port. Its advantage over the Antofagasta route for both European and American shipments of the tin, copper and silver of Bolivia will be considerable and will continue to be so until the completion of the Panama Canal, which it will undoubtedly antedate by at least several years. What this advantage will be may be appreciated by a comparison of distances. The significance of these is emphatic not only for Bolivia, but for well-nigh every section of South America because the energy of the country is still almost wholly devoted to the extractive industries and hence products are disposed of in the Atlantic countries of the northern hemisphere, and manufactured wares are desired from the same source. From Uyuni to the coast, via the Antofagasta line, is 300 miles and to Buenos Aires, via Jujuy and Tupiza, is 1,100 miles. But at these ports, the ore is 11,000 miles and 7,000 miles respectively from Liverpool. The Panama Canal would change these relations and give the Antofagasta line the advantage of one-third the number of miles of land haul and an ocean voyage of but 4,500 miles to reach New York, though in comparison with shipments to Liverpool this advantage is lessened to approximately 1,000 miles.

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* Hoek, H., Exploration in Bolivia, *The Geog. Journ.*, vol. 25, 1905.

Besides these advantages are those arising from the mineral wealth along much of the mountainous section of the line and the abundant agricultural products of Jujuy and the irrigated valleys adjacent which have awaited their best development for years until the completion of this outlet to the seaboard. Branch lines are being taken up slowly to the rich borax and nitrate deposits of the arid northwestern section of Argentina (those to La Rioja and Catamarca are already completed) and the deposits of copper and tin that occur there. (Fig. 12.)

## PLATEAU-PLAINS.

The various projects of the railroad development of eastern and central Bolivia are so intimately associated with each other that a general description of the circumstances leading up to the present activity seems desirable.

In 1904 there was signed at Petropolis, Brazil, a treaty* between Brazil and Bolivia for the settlement of a boundary dispute involving the territory known as "Acre." The land in question came into dispute through the influx of large numbers of Brazilian rubber gatherers and exploiters who found the then rich rubber territory in the valleys of the Purus and Aquiri, tributaries of the Madeira, but little developed by Bolivians. After a complex series of events, one of which was the formation of a new but short-lived "Republic of Acre," the difficulty was overcome by the treaty of Petropolis, by the terms of which Bolivia quit-claimed its right to 73,720 square miles of the disputed territory for £2,000,000. Bolivia acquired a valuable triangular-shaped district of 886 square miles between the Abuna and Madeira rivers and four other small pieces of land aggregating 335 square miles on the western bank of the Paraguay. In accepting the £2,000,000 for her lost territory Bolivia recorded her intention of applying the money principally to the construction of railways and other works tending to better communications and to develop commerce between the two countries. Other provisions of the treaty are of almost equal importance as the basis of the present movement of goods and as improvements designed to facilitate commerce. There is to be perfect liberty of land transportation and river navigation for both nations. Brazil agreed to build, within a period of 4 years, the Madeira and Mamoré railway from San Antonio, at the lower end of the series of falls on the Madeira, to Guaya-Mirim, on the Mamoré (one of the two main affluents of the Madeira, the other being the Beni) with a branch line to Villa Bella in Bolivia; and both countries are to be admitted to equal privileges and tariffs with respect to it. While the terms of the treaty have not been carried out to completion by Brazil in the time designated, a beginning of the line was made by the granting of a concession in 1906 to an American syndicate to construct port works at Para (Belem) at the mouth of the Amazon river. It is true that before this, i. e., soon after the signing of the treaty of Petropolis, the Brazilian Government granted a concession for the construction of the Madeira-Mamoré railway. The concession was granted to a Brazilian as against an American syndicate and French capital was secured to work it as a Brazilian concern. Nothing came of these activities, however, and the real beginning of the line dates from the purchase by an American syndicate of the Brazilian concession and the acquisition of the Para concession as well. It is understood that Mae, Jekyll & Co. are the promoters of the enterprise and that actual work is progressing rapidly. A party of thirty men under charge of H. C. Miller, at one time chief assistant in a Nicaraguan Canal survey, are actually engaged in the preliminary work. Warehouses, workmen's cottages, and even a cold-storage plant have been constructed; and about 40 miles of the new line are now complete.*

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* Daily Consular and Trade *Report*, No. 2987, Oct. 2, 1907. The Acre Territory and the Caoutchouc Region of South-western Amazonia, by Col. G. E. Church. *Geog. Journ.*, vol. 23, 1904, pp. 596-613.

New Boundary between Brazil and Bolivia. *Bull.* Am. Geog. Soc., vol. 36. 1904, pp. 215-216.

Survey Work on the Frontier between Bolivia and Brazil, Maj. P. H. Fawcett, *Geog. Journ.*, vol. 33, No. 2, Feb. 1909, pp. 181-185.

Quite apart from the interest that attaches to the commercial importance of the line is the widespread popular interest growing out of the construction of a railway in the depths of the Amazon forest over the same ill-fated route that marked the failure of the Collin's scheme of Philadelphia, in the late '70's, and that resulted in one of the most tragic episodes of modern industrial history.§ Only a few kilometers of rails were actually laid and no trade whatever was or is served by the line as finally abandoned. The falls of the Madeira remained the same stern obstacle to trade as formerly and Bolivia's dream of a highway to the Atlantic was rudely shattered, first by the failures in the construction work, and finally by the perfidy of the financial agents of Bolivia at London.

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* *Bull.* Internat. Bureau Am. Republics, Jan., 1910.

§ Recollections of an Ill-fated Expedition to the Headwaters of the Madeira River in Brazil. N. B. Craig. 1907, pp. 479, and map.

The two fundamental considerations in the estimate of the value of the Madeira route and the importance of the railway are, first, the character of the route as a highway, i. e., the physical layout of the region; and, second, the nature and amount of the products to be secured. The map, fig 4, represents the territory involved in this discussion and at once emphatically indicates the most important fact in the physical geography of the region, the convergence of all the river ways upon the Madeira above the falls. From Cachuela Esperanza on the Beni and from the falls of Guaya-Mirim

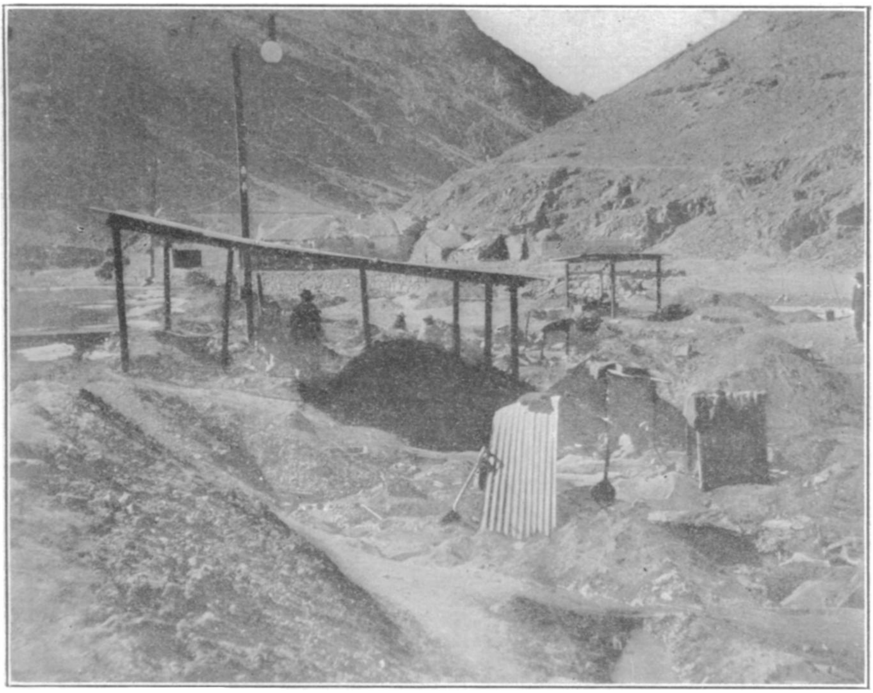

FIG. II.

Native mining works at Huynuni, Bolivia. At this locality very modern reducing works are also located, the ore being shipped by mule cart thirty miles to the railway. Heavy machinery is brought in, in the same manner.

on the Mamoré, 500-700 feet above sea level, there begins a line of rapids, varying in height and number with the height of the water, but there are never less than eleven, and they cover a stretch of river 229 miles long. They thus constitute a trade obstruction in the very throat of tropical Bolivia. The real significance of the obstruction is better appreciated by realizing that the falls occur from 300-500 miles from the base of the Andes, as the crow flies, or probably over 2½ times that distance by river course. They are not, therefore, on the edge of the tropical plains, but well within them. This fact alone would make them a serious impediment to traffic even if there were but a single main stream with few tributaries. But with these great affluents converging their waters and their commerce to the Madeira, the obstruction becomes a nuisance, an actual barrier to the commerce of all eastern Bolivia from its northern boundary to Sucre and from the altiplano to the eastern limits of the Republic.

The river freights are transported about the falls on land by means of rafts, canoes and batelons.* Goods are occasionally stored at San Antonio for months at a time awaiting transportation upstream, the number of canoe-men being always limited and often unobtainable. Boats that attempt to run the rapids at high water are sometimes successful, but the safer, though more tedious and costly way, is to unload the cargo and laboriously drag it around the principal falls. These are eleven in number. At six of the eleven the launches have nearly always to be passed overland, a total distance of 13,889 feet. There are five rapids where the launches must be unloaded and towed with ropes, a total distance of 12,628 feet. These figures total five miles of distance where the freight must be unloaded and carried overland. All the remaining rapids are difficult of transit where loaded craft shoot with the current or are dragged upstream near the river margin.†

What this drawing away of the Indian from agricultural or other productive labor means in a region where labor has always been scarce and expensive and what this means under the severe tropical conditions prevailing there may easily be inferred. In some cases the batelons are skidded around the falls over a corduroy of round, easily-rolled young timber. Col. Church states that the cost of transportating goods past the falls of the Madeira is no less than £85 per ton. Were chocolate and rubber less precious commodities or less indispensable luxuries to the people of the temperate zone they would never be able to bear the tax the falls levy upon these already expensively gathered products. As the trade of Caupolican Bolivia, the Yungus, and the Mojos, totals several million pounds sterling a year the tribute levied by the rocky obstructions and reefs is little short of enormous.

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* Several ton barges, strongly constructed.

† The Route to Bolivia via the River Amazon. A Report to the Governments of Bolivia and Brazil; G. E. Church, London, 1877, p. 183, *et seq.*

As for the products of the region which go down river and will feed the Madeira-Mamoré railway, they are to-day chiefly rubber, with some chocolate and hides, but the ultimate resources of the region, the limits of production, no one can estimate. Even to-day, difficult and expensive as transportation is, either up or down river, cattle grazing is an important industry on the grassy plains between Villa Bella, Reyes and Trinidad, and even as far south as Santa Cruz in Bolivia; while in Brazil and Paraguay the cattle-raising district extends still further south. The grassy plains between the lower Beni and Mamoré are the northern limit of the grass lands in Bolivia and are now scarcely touched by the limited stock of the region. The herds supply meat for the residents of the districts, hides for shipment and draught animals for the ox carts that, slow, uncertain and expensive, are notwithstanding, almost the sole means of transport away from the rivers. At present the downstream trade in hides is very slight, the bulk of the cargoes going upstream to La Paz and the Pacific coast. Cheap downstream transportation

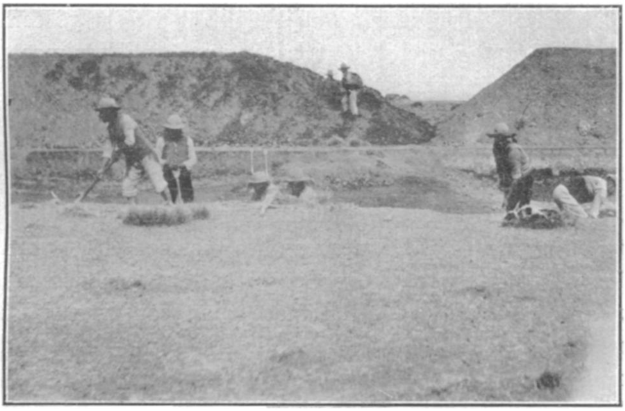

FIG. 12.

**Workmen grading the road bed between Oruro and La Paz (1907). Wheelbarrows are provided, but the Indians prefer to use their blankets. Each Indian must work fifteen days on the road at thirty cents a day.**

would mean a vast development of the cattle industry which requires but few laborers, a primary desideratum in this notoriously laborless land where the rubber industry itself would languish were it not for the system of enforced labor or peonage practised here almost universally. Not only would the hides find a profitable market in the leather establishments of the temperate zone, but the meat as well would be a source of great profit. Para and Manaos, particularly the latter city, which is only 600-700 miles from Villa Bella, could be supplied from the Bolivian llanos with fresh meat by transport boats of suitable pattern instead of being largely supplied with tinned meat from the United States and Europe, as at present. What a railway upstream to La Paz or Cochabamba would mean to the cattle industry may be gleaned from the fact that at Reyes, in north central Bolivia, a steer out in the field is said to cost 50 cents gold, tied to a stake $1.25, and driven to La Paz and sold for meat $35.00, if he survives the arduous journey of many score miles over a difficult trail.

Notable quantities of rubber and chocolate are likewise shipped upstream over the same routes via La Paz, Cochabamba and Oruro to the Pacific coast. These are return cargoes carried back more for the saving they effect on the merchandise that constitutes the downstream freight than for the freight earnings that the expenses of the uphill movement of goods often more than consumes. For it is a curious fact that Trinidad, Villa Bella, Santa Rosa and many other towns of this region acquire their supplies of merchandise largely from the west. Canned goods, cloth, iron and steel utensils, salt, tobacco, flour, potatoes, liquors, shoes, etc., are brought, some from the United States, via Panama, some from England, Germany and France, via the Straits of Magellan and taken over the Antofagasta or Mollendo railways to Oruro or La Paz. If to La Paz, they must be taken a two-days' coach journey to Sorata and so by pack animals to the Beni or the Mapiri; if to Oruro, by freight coach to Cochabamba and by caravan a journey of one to two weeks (depending on the state of the roads), to Santa Rosa at the head of canoe navigation. From this point on transport is easy. Indeed, the only seriously difficult part of this route from the shops of England, say, to the stores of Trinidad on the Mamoré is the one to two weeks caravan section from Cochabamba to Santa Rosa. The wet season may make the streams impassable between Cochabamba and Oruro, or the trail a bog-mire between the former city and Santa Rosa, but these are only short-lived difficulties. Several

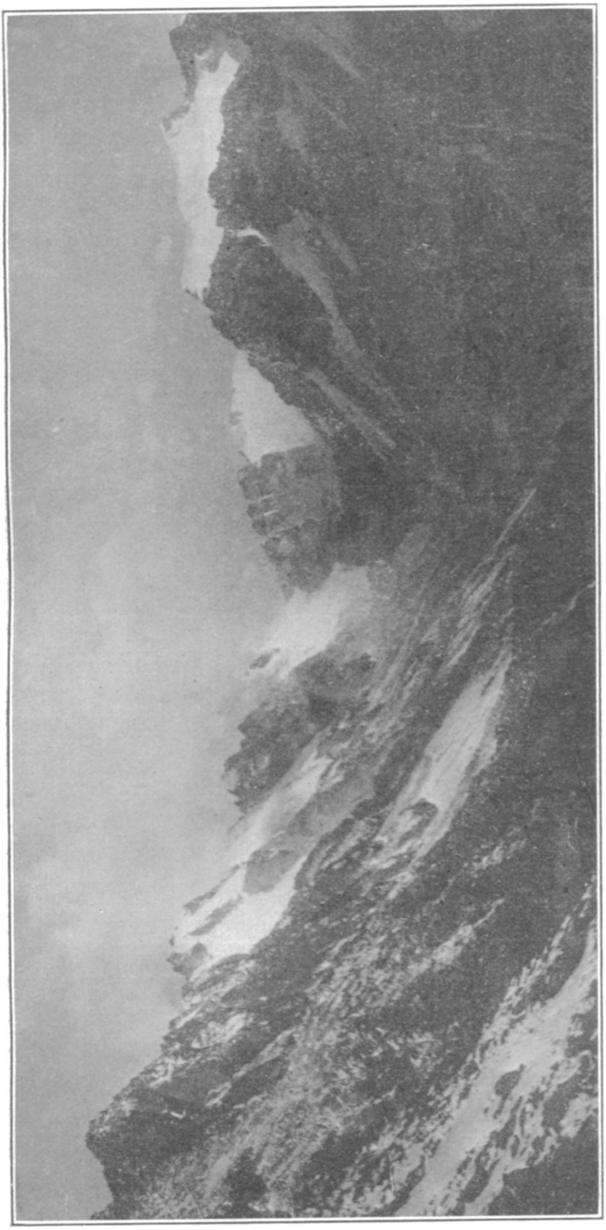

*Photo by Brooks.*

FIG 13.

The true mountain character of the lofty ranges that form the core of the great Bolivia Andes is indicated here. It represents a portion of the Nevados de Araca at about 17,500 feet, or the level of the snowline.

Cochabamba merchants make this downstream trade a special business and are able to supply their goods more cheaply and more certainly than those merchants who import via the Amazon and the expensive falls of the Madeira. There is thus a zone in the Madeira valley in which costs, via the Amazon route and the falls of the Madeira, and costs, via the Magellan and Pacific route, approximately balance. The balancing point appears to lie within the falls zone.

This fact alone expresses well the severe tax the falls are upon transport as compared with expenses elsewhere in the journey. Where they not so high, the pivotal point would, of course, depend on the relations of the more obvious factors of long ocean voyages, launch service and railway, and caravan transport. Very little plateau merchandise finds its way to San Antonio and likewise only small amounts of San Antonio goods are ever carried to Trinidad and Villa Bella. With the falls railway completed this pivotal point will be moved well up toward the head of launch navigation on the affluents of the Madeira, if, indeed, not to the very base of the Andes. It may even be that, with the completion of the Madeira railway and of the cart roads now building northeast of Cochabamba and north of La Paz, many of the villages on the eastern Andes may be supplied by up-river rather than over-mountain routes. (Fig. 13.)

Most of the rubber, chocolate and hides now shipped upstream and finally via Oruro and La Paz to the Pacific coast is curiously transported as to direction. The chief cause for these trans-Andine shipments is not a cheaper route, for it is, of course, a much more expensive route than the downstream one to Para, but merely that the canoes, and batelons, returning with difficulty against the current, from Trinidad, after disposing of their cargoes there, can more profitably bring light return cargoes than none at all and similarly the mules of the eastward moving caravans are hired for the round trip, not for the outward journey alone, and some return cargo is here likewise demanded. Merchants in Cochabamba, Oruro and La Paz are often paid for their imported merchandise in this way with the currency of the plains: rubber, chocolate and hides, from the upper Madeira.

It is doubtful even to the most optimistic student of Bolivia's resources whether the dream of numerous railroads penetrating to the eastern foot of the Andes (Fig. 11) will ever be an accomplished fact, except at a few highly strategic places. The traffic will scarcely bear more than two such lines in all the great stretch of country between the Beni and the easternmost counterfort, or spur, of the Andes at Santa Cruz de la Sierra. The two principal mule trails to tropical Bolivia are from La Paz to the Beni and from Cochabamba to the Chaparé and one or the other of these will undoubtedly be the locus of ultimate railroad activity. Such railways, by penetrating to the head of navigation on either of these two streams, could at once command by auxiliary launch service the traffic of the whole of a single great tributary. From the standpoint of such a railway the gravest defect of the physical geography of the tributaries of the Madeira is the existence of falls in both the Beni and the Mamoré, unfortunately just about their junction to form the Madeira. Were these eliminated, both streams would by launch service contribute their products to a single railway built to either stream. It is certain that the defect will delay railroad building many decades, if not centuries. The most reasonable solution that suggests itself is that the Beni territory will ultimately be served by a trans-Andine railway while the next southerly road will be to Santa Cruz and the Paraguay. From such trunk lines branches could then be extended along the eastern foot of the mountains and would likewise put the Mamoré basin into touch with rapid and cheap means of communication.

No one can fail to see the stimulating effect such a railway would have upon the eastern Andes. Few now unoccupied districts in South America would seem destined to an ultimate development greater than that of the eastern Andine valleys and the plains tracts adjacent. There one may find elevations and temperatures to suit every purpose and every constitution. No more delightful spots can be found in all tropical South America than here: suitable and relatively constant thermic conditions, sufficient rainfall, yet not a burdensome excess, timber for construction, rich products of field and garden and mine. The resources of the region are scarcely touched to-day. The eye roams over hundreds of square miles of delightful country with only the most insignificant scattering of agricultural folk. The necessities of life, the bananas, oranges, potatoes, meats, etc., are gained almost without effort; the luxuries, such as good tobacco, utensils of house and garden, and fine clothes, require but the most ordinary and limited attention to the cultivation of the coca tree and the curing of its leaf. Except for transport, partly on the backs of human carriers, of the coca leaf—the currency of the region—life is easy, tranquil, bountiful. The equalization of eastern tropical valley and plains products on the one hand and the plateau products on the other is now but feebly accomplished by a system of weekly fairs, of which that at Cliza, 30 miles southeast of Cochabamba, is undoubtedly the largest and most interesting. Every Sunday thousands of vendors from an area 50 to 70 miles in radius gather for barter and sale. Fruits and grains and cattle of the fertile Misque valleys and even sugar and rice from Santa Cruz are here gathered for exchange with the potatoes and barley and silver of the plateau Indians. It is one of the greatest trading pageants of all South America to-day. (Fig. 14.)

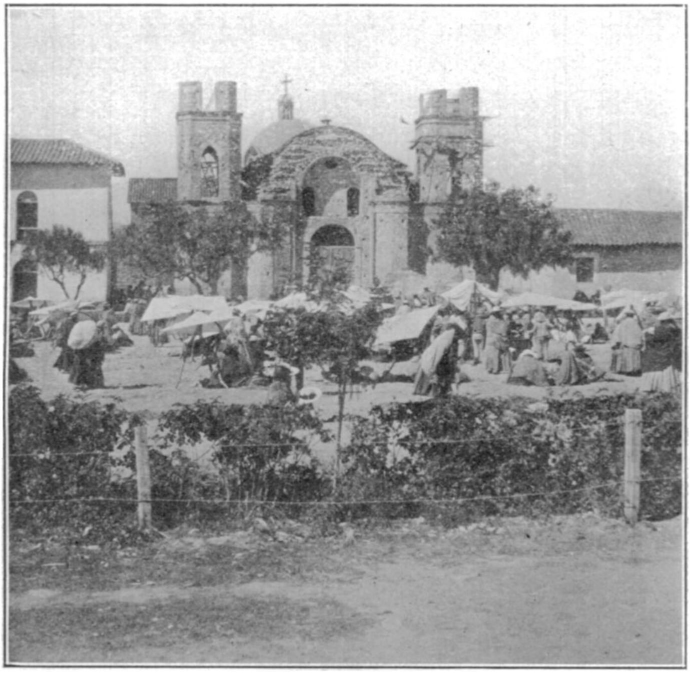

FIG. 14.

**Market day and the principal plaza at Sacaba, Bolivia, near Cochabamba.**

The town of Huynuni illustrates trade features similar to those at Cliza. It is 20 miles within the western edge of the eastern plateau, near the headwaters of a stream tributary to Lake Poopó. The elevation of the town is 13,000 feet and only barley and potatoes, llamas and sheep can be produced. The vegetables and other desired foods are imported from the valley of Llurivayi and others, 30 or 40 leagues east of Huynuni and at an elevation of 8,000-10,000 feet. It requires the greater part of a week to make the journey. There are regular market days sometimes once, sometimes twice a week in which the local vendors, in little booths, dispose of the cargoes. Purchases may be made on other days, but the stuff is apt to be inferior. One finds the market stocked with every variety of product—cabbages, lettuce, carrots, potatoes, oranges, many kinds of seeds, onions, salt, sugar, apple, peas, peanuts, meats, etc. Antequera, a mining town 7 leagues southwest of Huynuni, and numerous other mining centers in the plateau, are supplied in the same way from the eastern valleys.

For railroad, as for industrial purposes, the region possesses one unrivalled resource, its water power. Were the dynamic energy in the headwaters of Bolivia's streams properly utilized to-day there would be generated sufficient electrical power to run every railroad train now operated in the Republic, every one ever to be operated, every factory, every mine. It needs but a little attention to the subject to see that man has only to install a very few hydro-electrical plants, in strategic places, to carry goods easily up the different grades by the now unused waters that run down those grades. If it be argued that the limited commerce, as now developed, will not bear the expense, it is only necessary to point to two inevitable benefits: first, the enormous stimulation to production that such cheap and easy transportation would effect; and, second, the transference of electrical power from the eastern Andes to the central plateau is one of the sanest present-day possibilities and would at once eliminate that great expense of the plateau railroad, coal. The coal now burned there costs $20 to $30 per ton and the rate is ruinous. Bolivia's coal resources are practically nil. She must continue to import coal whose cost even at the centers of population is bound to suffer rapid increase in the near future. The water power of the Loa valley in Chile, generated at almost negligible expense, is now the substitute for expensive coal at Santa Fé, one of the greatest nitrate establishments in Chile. In Mexico a cable 110 miles long conveys the energy generated at a waterfall to mines near Durango. A dozen hydro-electrical plants in the United States generate power that is conveyed over comparable distances. There are, within 70 miles of Cochabamba, no less than a dozen never-failing streams, any one of which would carry the freight and passenger traffic and do the business of a city of 1,000,000 people. It is the folly of the industrial age that these sources of power should lie untouched in the very region where one may actually see Indian carriers bringing rough-hewn planks of tropical cedar wood laboriously on their backs, a week's journey over one of the most difficult trails in existence, to forestless Cochabamba for the purpose of making furniture! What Bolivia needs to supply power and bring the products of the plains to her more densely inhabited plateau is not a great coal deposit, but dams. Coal deposits are exhaustible, but the water power of Bolivia's magnificently watered eastern slopes is as permanent as the slopes themselves, and while one in a geologic sense may describe these as ever-changing, in an anthropogeographic sense they are eternal. Anyone who sees in the lack of wood on the altiplano of Bolivia, and in the lack of coal throughout the Republic generally, a fundamental defect for any future industrial Bolivia is blind to the clear facts of easily accessible water power and its realized possibilities in other lands. The heavy machinery required for electrical plants of adequate size would be difficult of transport away from the railroad, but it can be made in lighter and more feasible units whose transport would be relatively easy of accomplishment. If pianos can be taken to Sucre and heavy rice threshers to Cochabamba, surely dam and dynamo equipment can be taken to sources of water power of such enormous importance and amount. (Fig. 15.)

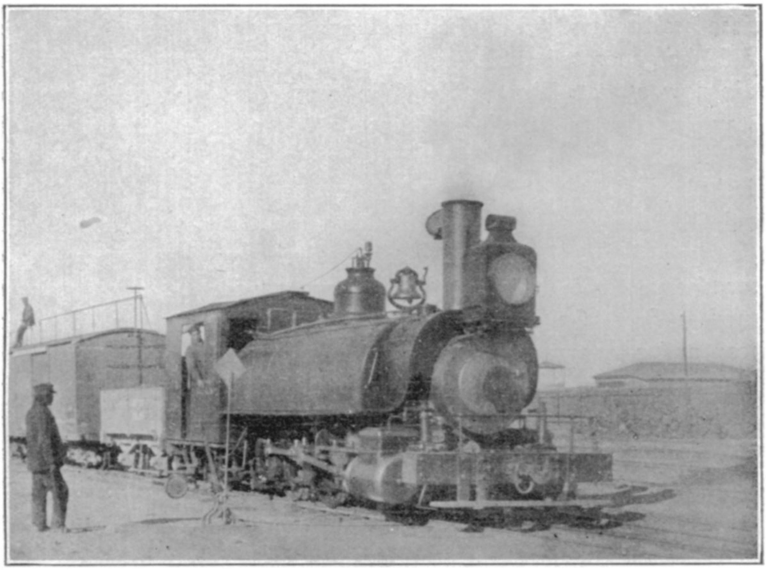

FIG. 15.
Type of locomotive and freight car employed on the Antofagasta-Bolivia R. R. (meter gauge), 1907.

(*To be concluded*)